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Suzuki

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(54) **SWITCHING DC-TO-DC CONVERTER
HAVING ON-TIME SIGNAL GENERATION
CIRCUIT AND METHOD FOR GENERATING
SIGNAL INDICATIVE OF CONVERTER
ON-TIME**

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(58) Field of Search **323/282, 283,
323/288, 325, 326**

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(57) **ABSTRACT**

An on-time signal generation circuit for use in a switching DC-to-DC converter, a switching DC-to-DC converter including such a circuit, and a method for generating an on-time signal which is a binary pulse train comprising pulses T_{ON} , where the width of each pulse T_{ON} is equal to $T_{OSC}(V_{out}/V_{in})$, where T_{OSC} , V_{in} , and V_{out} are, respectively, the switching period and the input potential of a DC-to-DC converter, and a control potential. The control potential V_{out} is one of the output potential of the DC-to-DC converter and a DC potential proportional to a desired level of such output potential. The on-time signal generation circuit includes a comparator, a ramp generator with an output coupled to one input of the comparator, and an amplifier with an output coupled to the other input of the comparator. The ramp generator generates a periodic ramped potential having peak level kV_{in} and period T_{osc} . The amplifier receives the control potential kV_{out} and is configured to assert an amplified potential kV_{out} in response thereto. In response to potential kV_{out} from the amplifier and ramped voltage kV_{in} from the ramp generator, the comparator asserts a pulse train comprising pulses T_{ON} . The width of each pulse T_{ON} is equal to $T_{OSC}(V_{out}/V_{in})$, and thus is indicative of the nominal or critical power switch on-time needed for the DC-to-DC converter to produce an output equal to V_{out} in response to input V_{in} . Preferably, the on-time signal generation circuit is implemented so that the width of each pulse T_{ON} is equal to $T_{OSC}(V_{out}/V_{in})$ independently of process variations and variations in operating temperature.

24 Claims, 4 Drawing Sheets

